

Awareness of the Innovative Development of Mining Enterprises in Tajikistan

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Abstract: In the article mining industry is characterized as one of the most important strategic sectors of the developing economy of the country and it is specified that economic stability is largely determined by the activities of gold mining enterprises, many of which are not in the best position, as there are problems that limit their development. It has been substantiated that in Tajikistan, where a market economy is being formed, the innovation policy is aimed at implementing measures to ensure the balanced development of science and industry, the development of innovation infrastructure, the creation of conditions for the commercialization of the results of scientific research and development, and professional training adequate to the needs of innovative development.

Introduction

At this stage of economic modernization, Tajikistan's mining and metallurgical industry is focused on exporting raw materials and primary metals. Obviously, an important task of the innovative development of the industry is to increase production and sale in the world market of competitive high-tech products containing a large share of added value due to the intellectual component. The intellectualization of the economy and digitalization of economic processes in the national economy enhance the activation of innovation processes.

The main tasks of the state support of innovation activity are: creation of the system of complex support of innovation activity; improvement of the system of information support, system of certification and promotion of developments; improvement of the competitive system of selection of innovation projects and programs; selection of relatively small number of the most important basic technologies, which have a decisive influence on improving the efficiency and competitiveness of products in the sectors of the national economy; purchase of equipment for the following purposes.

The innovation component is the most important aspect of the country's economic policy, which is why there is a growing need to intensify innovation and

investment processes at enterprises. It will allow to pass from raw-material orientation in economy on an innovative way of development, and also to creation of the modern enterprises, capable to let out competitive production meeting the world standards to working out and realization of high technology. Proceeding from these prerequisites, there is an objective need to create an innovation infrastructure of the national innovation system [2].

Formation of conditions for transition to the innovative economy and creation of high-tech industrial production assumes technological transformations at enterprises providing innovative economic growth. In this regard, the National Development Strategy of the Republic of Tajikistan for the period until 2030 predetermines the main priorities in the industry. Among them, “creation of institutional foundations for sustainable and preventive development of industries, creation of innovative high-productive clusters” is particularly emphasized [5].

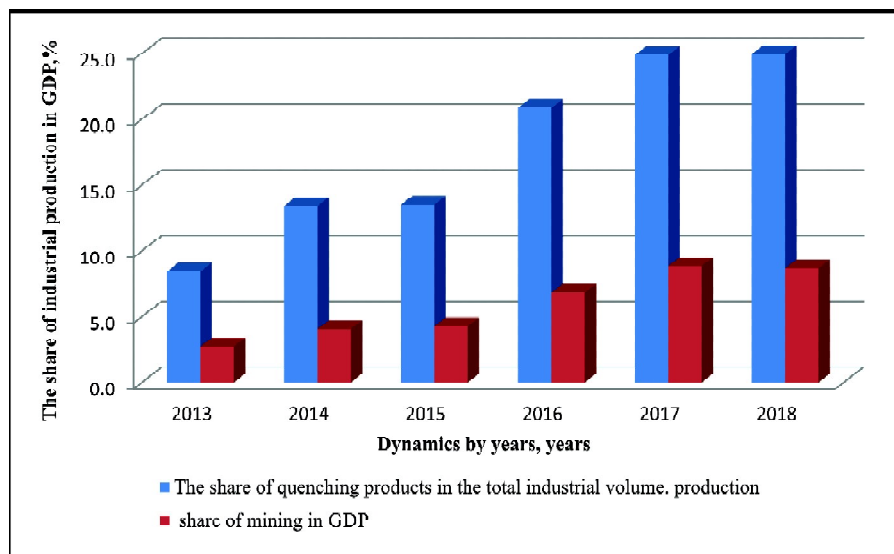
The state policy in the development of the mining industry is aimed at stimulating the production of basic (base) metals by large enterprises and the creation of production of final products with the involvement of foreign capital.

Obtaining high purity metals requires the creation of a full cycle of production of final products, which includes an enrichment plant with the production of semi-finished concentrates and metallurgical processing, a product that is high frequency metals that meet the needs of customers and various industries. Compared to metallurgical processing, the creation of enrichment plants does not require large investments, as the processes used at this stage are resource efficient and energy efficient. Tajikistan is rich in small deposits, and in this regard, involved in processing into ore concentrators does not allow obtaining concentrates of required volume for creation of metallurgical processing. The latter has become one of the main reasons for hampering the development of metallurgical industry. Therefore, semi-finished products for processing and obtaining high frequency metals were exported outside the country (China, Kazakhstan, Kyrgyzstan), where metallurgical processing is available. Concentrates were accounted for by one metal each, which resulted in significant losses of other metals. For example, concentrates produced at the Zarafshon JV LLC, one of the largest enterprises, and exported for processing, included in significant quantities, along with gold, also had silver, copper, cobalt, rare and rare-earth metals. Concentrates produced at TA OOO Anzobsky GOK and exported - along with antimony contained gold. The same situation was observed for other enterprises producing semi-finished products and exported them to obtain high frequency metals outside the country. In addition, due to the complex composition of ores of local deposits, when obtaining target metals of high purity from concentrates of Tajikistan on the basis of foreign metallurgical plants, which have a different technological chain that does not take

into account the specifics of our products, losses in the target metal amounted to 40-45%.

Taking into account the above mentioned problems, the Leader of the Nation, President of the Republic, respected Emomali Rahmon in his message in 2014 was reasonably instructed to limit the export of concentrates outside the country for processing and to create a full cycle production inside the country. This was a powerful incentive to develop and implement innovative projects, create new jobs and expand the range of high-frequency products. These solutions are expected to have a positive impact on the growth of industrial output in the mining sector (figure 1).

Figure 1: Growth dynamics of mining products in the industrial output and GDP of the Republic of Tajikistan for 2013-2018

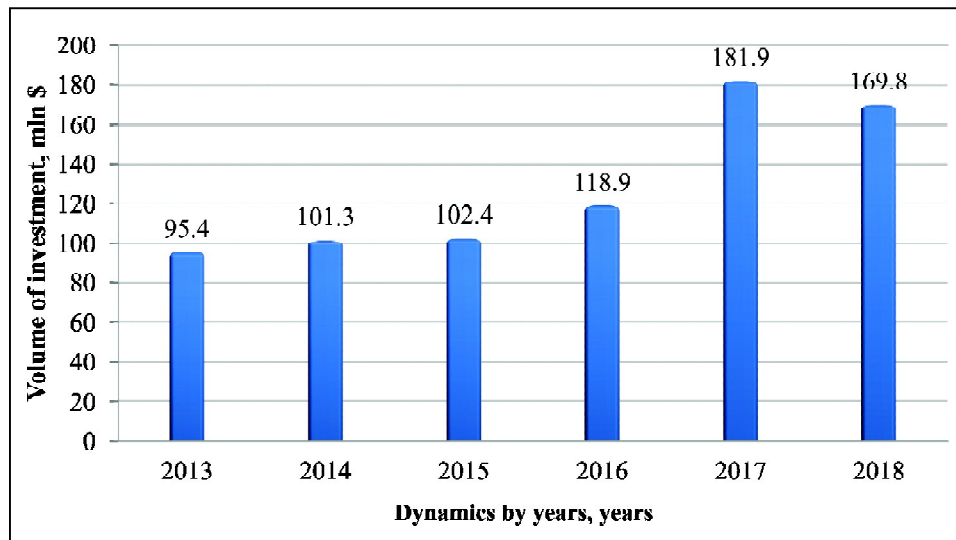


Source: compiled by the author, based on data from the Ministry of Industry and New Technologies

Investment and innovation processes in the Republic of Tajikistan represent a complex system of formation of resources, order and mechanisms of realization of innovative activity of subjects of national economy. Mechanisms for the implementation of these activities are presented in the National Development Strategy of the Republic of Tajikistan for the period up to 2030, as well as in the Programme of Innovation Development of the Republic of Tajikistan for 2011-2020, designed to facilitate the systematization of innovation development in the long term [3].

One of the important decisions taken at the government level in the framework of achieving the 4th strategic goal of the country - industrialization - is the removal of duties on imported new technologies and equipment. In addition, investment in the country's mining sector has been increasing in recent years (figure 2).

Figure 2 : Investments in mining industry for 2013-2018 (mln USD)



Source: compiled by the author, based on EITI 2018 data.

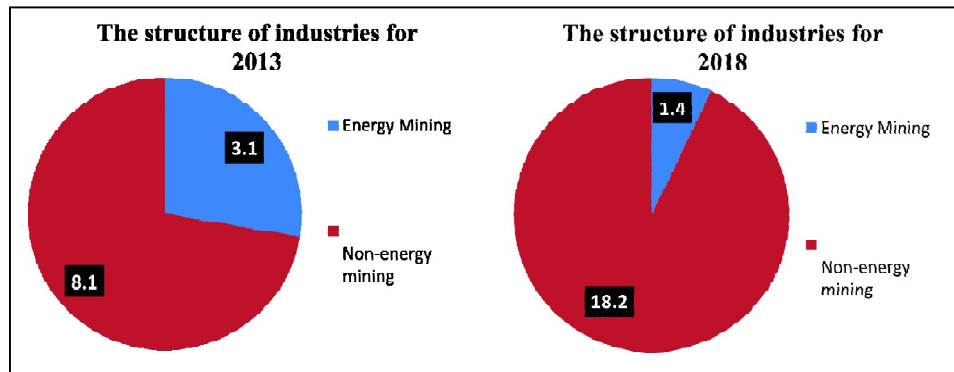
According to the data of the Statistics Agency under the President of the Republic of Tajikistan for 2018, foreign investors have invested 645 million dollars in the Republic's economy [7]. At the same time, about USD 326 million were allocated for industrial development, construction, geological exploration and development of mineral deposits in the country. Russia and China have invested most in Tajikistan's economy.

The share of the mining sector out of the total amount of investments in industry in 2017 was 58.74%, and in 2018 it was 58.74% - 61.66%. However, in absolute terms, the amount of investment in the mining sector in 2018 decreased by \$ 12.1 million compared to 2017. (Fig. 2)

The National Development Strategy until 2030 provides for the largest growth in the extractive industry - 5.7 times in the industrial scenario and 6.4 times in the industrial-innovative scenario. In this regard, increasing the innovation activity of the mining industry is the most important task.

It should be noted that the analysis of the structure of industries in 2018 shows that mining industry accounts for 19.6% of the total industrial output. Of

Figure 3: Extractive industries structure for 2013 and 2018.



these, 18.2% are not energy materials, but only 1.4% are energy materials. The analysis revealed that, compared to 2013, the share of energy materials production decreased by 45%, while the share of non-energy materials production in the total industrial output increased by 225%.

The increase in the share of non-energy materials in the extractive industry is associated with the implementation of a number of key innovation projects based on industrial enterprises, including gold mining. In recent years, this very sector of the mining industry - gold mining - has become the object of innovative development. This is primarily due to the stability of gold prices. In the conditions of Tajikistan, with cheap labour, the profitability of gold production is always higher than in other countries. According to experts' estimates, the cost of a received ounce of gold in Russia is about 200 dollars at a sale price \approx 1200 dollars. This figure due to the cheap labor factor can be 10 - times lower in Tajikistan.

Currently, there are two sources of gold production: primary and alluvial deposits. The bulk of the gold production comes from the factories processing the indigenous deposits - more than 95%. The main enterprises processing the indigenous deposits are JV Zarafshon, JV Pokrut and JV Aprelevka.

Zarafshon JV LLC is owned by the Government of Tajikistan jointly with the Zijin mining company and is one of the following from large enterprises of the gold mining industry of the country, which has almost completed the technological cycle: mining, processing and metallurgy - refinement of gold with the production of finished gold bars. Over the past 10 years, innovative projects have been implemented on the basis of this enterprise. For example, by attracting Chinese investment in 2012, a gold extraction plant was established to process persistent oxidized ores at the Tarorskoye deposit, one of the largest deposits in Tajikistan with a capacity of 2000 tonnes of ore per day. In 2014, an innovative project was implemented to

create on the basis of the Zarafshon JV a modern refining plant with a capacity of 5,000 tonnes of gold per year using innovative technology, which allows to obtain gold bars of highest purity. In 2015, an innovative project was implemented to create a new gold recovery plant with an annual capacity of 10,000 tonnes of ore, which is three times higher than the production volumes of the plants operating at the plant. Along with the abovementioned major innovative projects, the enterprise annually implements innovative, energy efficient, improved technologies, etc.

At present, Zarafshon JV produces copper concentrates with gold content of up to 120 g/t (up to 6 g/t in ores) during processing of hard ores. Previously, these concentrates were exported to China and Kazakhstan for processing. Following the introduction of the export restriction on semi-finished products, these concentrates are stockpiled at the facility. The Chinese design institutes have proposed two innovative projects based on modern technologies to establish a concentrate processing plant. The payback period of the projects, including the construction period, is 6.56 years. These figures have been calculated, and in case of changes in the price of gold in the range from USD 1,000 to 1,400 per ounce and copper in the range from USD 6,000 to 8,000 per ton, and the economic efficiency has been confirmed.

In general, it can be noted that for implementation of innovative projects, JV “Zarafshon” is the leading one in the Republic of Tajikistan.

Pakrut LLC is a new gold mining company in Tajikistan, which is owned by China Nonferrous Gold Limited Corporation. The company started extracting gold from the Pakrut deposit in 2016.

The Pakrut deposit contains over 1 million ounces of gold. The deposit was discovered back in 1972, while work is underway to replace cyanide with a cheaper reagent called FlotentGoldSC. This reagent is produced in China and scientists around the world are focused on studying its composition. This reagent is widely used in China and Tajikistan is the first country on the basis of which industrial tests to confirm its applicability are conducted. Its use will reduce the cost of products by 60%.

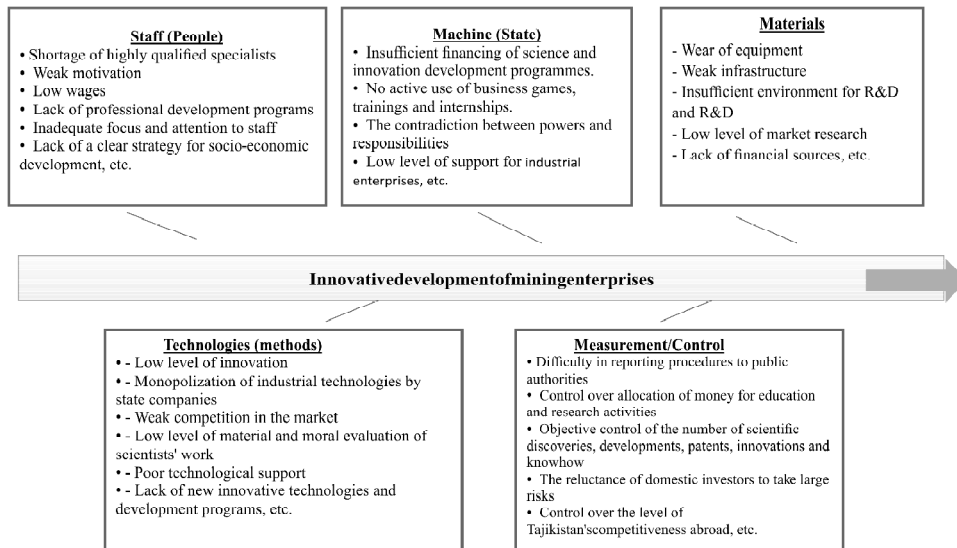
JV LLC Aprelevka is a Tajik-Canadian joint venture. One of the significant innovation projects proposed for implementation on the basis of the Aprelevka JV is a technology based on the use of ultrasonic devices, which was tested in 2016 and established an annual additional economic effect from its use is \$ 9 million. The technology based on ultrasonic devices was implemented on the basis of Zarafshon JV with an economic effect of RUB 38.4 million.

Greater investment in the mining sector is required to boost innovation. Tajikistan’s remote location from world markets and major transport arteries means

that transport and infrastructure development costs often become factors limiting the extraction of mineral resources. Based on the analysis of Ishikawa’s chart, we will try to identify the most significant reasons for the constraint to innovative development of mining enterprises on the 5M principle (Figure 4) [4]:

- man (man)
- machine
- materials(s)
- methods, techniques
- measurements (measurement, control).

Figure 4 : Ishikawa Diagram



Conclusion

On the basis of the above analysis, it can be concluded that the most important reasons that create problems for the innovative development of the country’s mining enterprises are as follows:

- Lack of a clear strategy for the innovative development of gold mining enterprises;
- the virtual absence of innovative technologies and programmes for their innovative development;
- insufficient funding for innovative technologies;

- an imperfect mechanism for stimulating workers at enterprises, as well as a lack of highly qualified personnel;
- the low level of development of the innovation infrastructure at enterprises;
- a high level of risk in investing in the implementation of innovative projects in gold mining enterprises.

Significants

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